BULLET PROOF YOUR HOME

It is important to realize that there are limitations to any level of destruction resistance you may wish to design for. Any protection level above resistance to vandalism and easy intrusion becomes expensive. Bulletproofing is not difficult for walls, but is very expensive (or used to be) and hard to conceal if used in doors and windows. Higher levels of resistance for tornado, earthquake, or war-time destruction can be so cost prohibitive that it is better to use relocation strategies for defense rather than further hardening of the structure. As you are aware, I do not recommend making a home into a fortress (with gun ports, etc.), nor do I recommend defending it as a bunker – at least while you have other choices. Fixed targets are always vulnerable to other tactics such as isolation from resupply, chemical weapons, or even fire. In the final analysis, the opposition can usually come up with more powerful weapons than what you are using for

defense, since they are not constrained in time, location, or resupply. That is where strategic design comes in–having more than one escape route, for instance, and other contingencies. These are only useful, however, if you use them in a timely manner before such options are cut off or unavailable. I will stress the following three types of residential hardening from a construction strategy point of view. These correspond to security levels 3-5 listed previously:

- LEVEL 3: A conventional, above-ground structure with normal utilities, vandal-resistant doors and windows, high quality locks, high security basement shelter, and a passive security system.
- LEVEL 4: A bulletproof wall construction above ground on the main floor with non-bulletproof (but entry-proof) windows, heavy metal doors, basement security shelter, and underground secured utilities. An active security monitoring system that gives real time information on intruder sound and location.
- LEVEL 5: Full bulletproof exterior including walls, windows, and doors; fireproof exterior construction; full perimeter security fencing; protected underground utilities (or full self-sufficiency); and full security private basement under concrete slab, with privacy entrances. Active, remotely-activated defensive measures.

Most of my readers with ample funding will select Level 3 or 4 for their security needs. Only in very special situations would someone need Level 5. To accomplish Level 5, one would not only need a great deal of money, but would also need to hire their own construction crew of highly loyal and reliable people so that it could be done in absolute privacy.

SECURITY OF MAJOR STRUCTURAL ELEMENTS

Walls

Conventional non-masonry wall construction has very little resistance to destruction. Wood stud walls, the most common type, are designed with minimum structural strength and high insulation value, mostly for cheapness of construction. If the exterior facade is of wood, vinyl, or aluminum siding, there is little destruction resistance, and no bulletproof value. In the event of a weapons attack, the only value your walls would serve would be to shield your position from view. Even the wood studs will not stop most bullets. A brick exterior is the most preferable of the conventional construction types since it does offer initial resistance to bullet penetrations as well as to most types of vandalism. The mortar joints, however, are soft enough that brick walls will not stand up to multiple shots in the same general area – the wall starts crumbling down. Stucco, though it appears solid, offers no effective projectile resistance. The old style stucco that was an inch thick and more like concrete was more effective than today's high-tech, flexible stuccos. The anti-cracking formulas of today are softer and more elastic and are fairly easy to penetrate. Even concrete block houses are not fully bulletproof unless the

voids are filled with concrete and the joints are reinforced with steel ladder wire and R-bar. Hollow concrete block is very brittle and will disintegrate rapidly under multiple shots.

Vandal Resistant Exteriors

The types of exterior wall surfaces that are best for moderate resistance to vandalism attack, short of bullet resistance are, in order of preference (best to worst, without regard to aesthetics):

- Stucco (both cement-based and epoxy-based): Normal Stucco has a moderate fire resistance rating, is moderately flexible, strong, and easy to repair. It is not stain resistant, but can be repainted easily. "Geobond" Stucco is absolutely fireproof and has some bullet resistance.
- Vinyl siding: Vinyl is flexible, stain proof, sun resistant and very tough. It is easy to repair but not fire- proof.
- Steel siding: It is not flexible and will dent easily. It is not as easy to repair as vinyl but it is more fire resistant. The paint coating can wear through if bushes rub against the walls.
- Log walls: Flexible, easy to repair (unless deeply damaged). Will stain, but is fire resistant – in that it takes a long time to burn through, unlike hollow wall construction. Note: Log walls are mildly bullet-resistant. It takes about 24" of dry oak to stop a high velocity rifle bullet.
- Wood siding, log siding: These veneer surfaces are fairly strong and resilient and look good. However, they are not fire or stain resistant. They are easy to repair physically, but difficult to match to the existing siding due to sun discoloring.

Bullet/Projectile Resistant Materials

Bulletproof ratings by "levels" from most economical to least:

LEVEL 1: Up to .38 special (1,280 ft/sec [fps] and 475 ft-lbs. of muzzle energy)

LEVEL 2: Up to .357 magnum, 9mm (1,450 fps and 750 ft-lbs. of muzzle energy)

LEVEL 3: Up to .44 magnum rounds (1470 fps and 1,250 ft-lbs. of energy)

LEVEL 4: Up to 7.62, 30-06 rifle rounds (2,523 fps and 3,102 ft-lbs. of energy)

LEVELS 5-8: Deal with major military applications beyond the civilian arena

Brick and Hollow Concrete Block

Brick and hollow block are only marginal shields for high powered projectiles. But they are readily available and relatively affordable. Both can be made much stronger with R-bar and ladder wire in the voids. Concrete block is often reinforced with voids filled. But few people know that brick can also be reinforced. Each brick has 3 holes in it,

through which you can place #3 R-bars. Small 4-inch ladder wire can be placed in the mortar bed every 2 or 3 courses. Solid masonry walls must have interior insulated walls to achieve proper environmental control.

The Gravel Wall System

The best and most efficient form of bulletproofing (when you desire a completely hidden or do-it-yourself system) is something I developed within the last 2 years. It involves the use of 3/4 or 1/2-inch gravel packed within the outer walls of a framed home. For maximum effectiveness, you must use *steel studs* instead of wood studs for framing. Wood studs are not bulletproof and you don't want to take a chance on a stray bullet coming through a wood stud. The best thing about gravel is that it can take *multiple hits with no degradation*. It simply chews up bullets, unlike brick or cement which can be chiseled away by multiple shots. A measly 3-1/2" stud wall will absorb the full impact of multiple high velocity 7.62 military rounds without degradation. The disadvantage with this system is the need to build a second interior wall on the inside if you need insulated walls. But the total double wall system gives you extraordinary soundproofing as well as shielding from the latest infra-red snooping equipment. If you live in a mild climate, you can simply apply 1" foam sheathing over the plywood sheathing on the outside, inside, or both sides and then use whatever interior or exterior finish you desire. I will explain how to build these walls shortly.

Reinforced Poured Concrete

With the advent of the new foam blocks for forming concrete, it is practical to build an entire home out of cement. The forms have built-in plastic ties to which interior and exterior siding can be attached. Use only the types of forms that are capable of producing a full 6 or 8-inch thick wall – not the types that pour a lattice-work of concrete. The parts of the wall that are all foam won't stop much of anything.

Kevlar/Fiberglass Bulletproof Panels

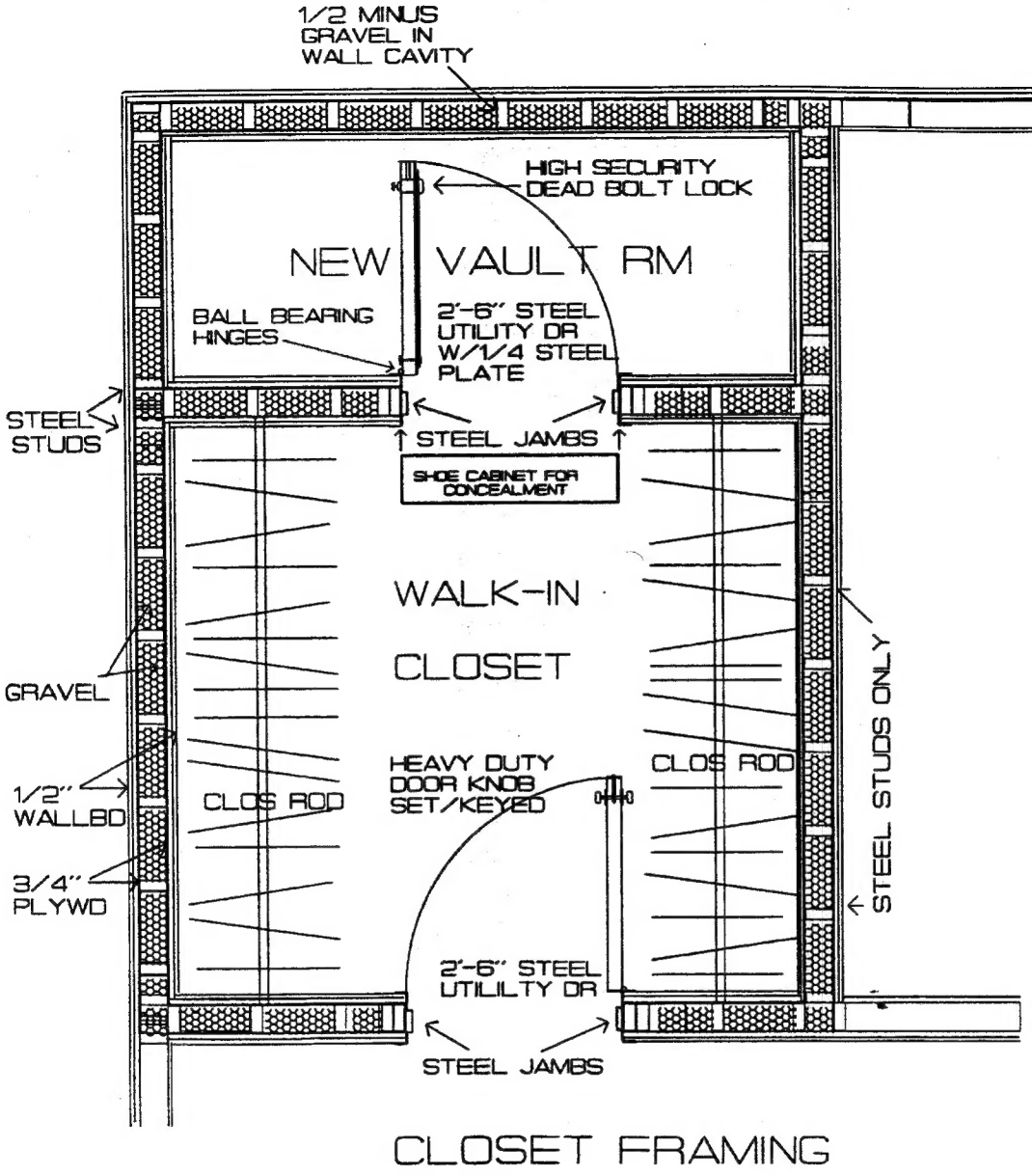
These can be purchased in large sheets of various protection levels and cut like plywood. They can be used as exterior sheathing on frame construction to give fairly good bulletproofing. They will not sustain multiple hits in the same general area, and they are fairly expensive. (See the "Recommended Equipment and Sources" section.)

Armored Steel Panels

These can be installed at even greater expense. Every 4x8 sheet will cost you about $400. While costly, it is reasonable for many high security installations.

Building the Gravel Wall Protection System

(See illustrations) I will deal with the two basic alternatives: single and double wall construction. The first illustration shows a hardened closet floor plan. This demonstrates one of the prime uses of this gravel bulletproofing: building a secure walk-in closet within the master bedroom complex. You may also decide to harden all the walls of a master bedroom to ensure against intrusion at night when you are sleeping and



CLOSET FRAMING

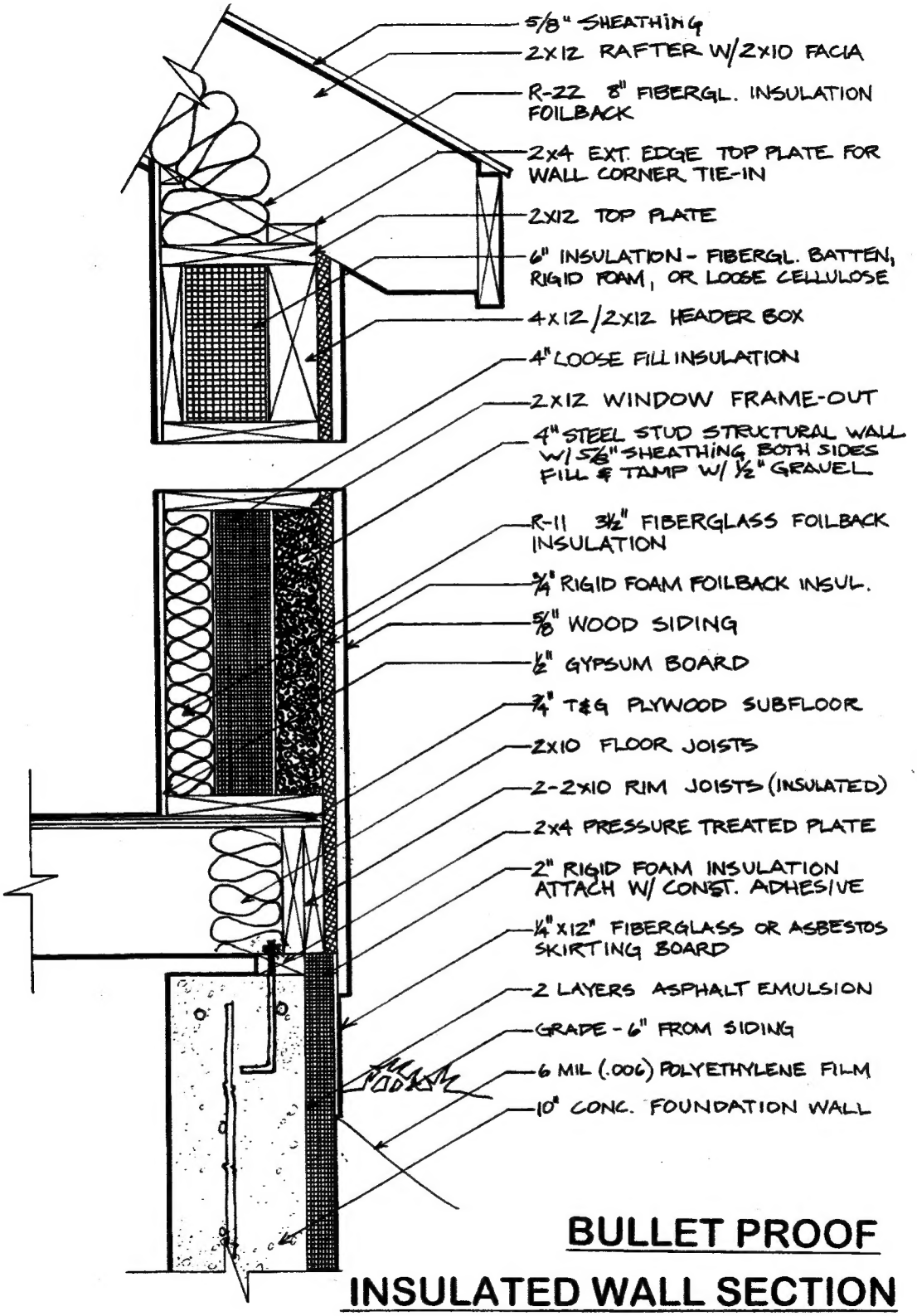
GRAVEL BULLET-PROOF WALL SYSTEM

vulnerable. As with all these gravel wall designs, use steel studs instead of wood for maximum effectiveness. The illustration shows a hollow box for each stud for clarity. In reality, the steel studs are shaped like a squared-off "C." So when the gravel flows in around it, there is virtually no space for a bullet to squeeze through without encountering the gravel barrier – unlike wood studs which provide a 1-1/2 inch space of soft wood for the projectile to bypass the gravel. You must mount 5/8-inch or 3/4-inch plywood to the studs as primary sheathing, so that the compressed weight of the gravel does not bow the wall surface outward under the pressure. Sheetrock will not hold the weight and will lose its connection strength quickly under the vibration of multiple bullets hitting the gravel. Interior walls can then have 1/2-inch or 5/8-inch sheetrock placed over the plywood for a finished surface. For electrical wiring within these walls, use metal boxes and place electrical wiring in metal conduit for protection against the abrasion of the gravel. The metal boxes surrounding the duplex outlets will also help them stay in place better than plastic boxes.

This wall has tremendous sound deadening features as an added benefit. This can be increased even more by adding a layer of 1/2" foam board between the sheetrock and the wall sheathing. Greater soundproofing is achieved by using two dissimilar layers of sheetrock on top of one another such as 1/2-inch sheetrock followed by a layer of 5/8 sheetrock. Different thickness absorb different sound vibrations. Remember that a bulletproof wall is not much help unless you install a bulletproof door and jamb. Follow the recommendations in the door section below.

The next illustration shows a section detail of an exterior steel-studded wall filled with gravel with a second interior wall for insulation. The drawing shows a 12" thick wall for superinsulation. This could be reduced to two 4" walls side by side, with no insulation space in between, for those areas not requiring superinsulation. Simply use the appropriate width bottom and top plates to match the desired wall width.

Double wall construction is done as follows. The main exterior structural wall, which supports the roof is constructed from steel studs with 5/8-inch or 3/4-inch plywood (or OSB board) mounted on each side. No plumbing or electrical will go inside the gravel wall. Next, on the interior side, erect a normal 2x4 wall (can use either wood or metal studs) about 1/2-inch away from the exterior wall. This wall will be insulated and will contain all normal electrical and plumbing materials. Leaving a space between the two walls helps with soundproofing and also allows for easy threading of electrical wire, so the studs do not have to be drilled. Fill the spaces completely with insulation to avoid creating vertical paths for fire inside the walls. The newer foam-type insulation seals all gaps between stud spaces.



BULLET PROOF
INSULATED WALL SECTION

Filling the walls with gravel is fairly easy. Install the plywood sheathing on the bottom half of the wall (using grabber screws every 6 inches on center – not nails) and fill with gravel. Order what is called "half-inch-minus" gravel. This means gravel that is run through a 1/2-inch separator. You will only get gravel 1/2" and less in size. You can use 3/4"-minus, but it is a little harder to come by and more difficult to compact. Do not go any lower in size than 1/2-inch. Sand-sized particles stop bullets by friction and will require a much thicker wall to accomplish the job. Larger gravel actually causes the bullet to ricochet and change directions, forcing the bullet to deform and loose its conical shape. After the first impact the bullet is so misshapen, it doesn't have good penetration capacity and quickly gets chewed up.

Pound on the lower parts of the plywood to vibrate the gravel downward. Now, before installing the top half of plywood, cut off the top 5 inches on the plywood (on one side of the wall) so that you will have a gap at the top for installing the upper gravel layer. By the way, you must use tongue and groove edged plywood so that the seam at the 4 ft. level doesn't split outward. Fill the upper half through this gap using a large metal dust pan for a wide scoop. If you have a second story above, you can also build a custom trough and pour gravel in from buckets above. This is much faster than hand scooping it in. Have someone tap and vibrate the wall to make sure the gravel packs in tightly. This is essential for making sure the bullets cannot work their way through the gravel spaces. When full, install the 5-inch strip you cut off to close the wall in. There will be a small gap at the top without gravel, but this will be well above the threat zone for normal-sized people.

Security Doors

The most vulnerable part of a door is the latching mechanism and jamb material. Most door frames are of clear fir or pine which is set into a stud wall frame. Depending upon the gap between jamb and structural frame, you may find that the jamb has been shimmed out as much as 3/4 inch. The only shear strength of the door frame is found in the nails that connect the wood jamb to the nearby framing. With soft finish nails, that's not much protection. If you want wood jambs, specify oak or a similar hard wood and shim the full width of the frame with various thickness of plywood set with nails and construction adhesive. Set your door knob strike plates into the jamb with long 3" hardened screws so that the metal strike plate can't be dislodged. If you have a fairly conventional door, you can strengthen the area around the dead bolt and the door knob by installing steel or brass shield plates, sold at most lock shops. These deter a thief from using a chisel or screw driver to remove chunks of your door between the locks and the jamb. If they succeed in breaching the door in these places, the door can be levered open with a bar.

My preference is for metal door jambs, even if you use a solid wood door. They are much stronger than the best woods. Vault locking mechanisms for doors are now available that slide four bars into each face of the door jamb. And there is one company that makes a threshold vault-type lock that keeps the bottom of the door from being kicked in. These types are recommended for main exterior doors, the master bedroom door and the high

security shelter or storage rooms. Note that the expense of bulletproof doors on the exterior of the home is not justified if windows are not likewise protected or if you lack masonry walls. Always watch for the weakest link in your external security. The typical residential metal front door is not really a security door. These are built with a foam sandwich technique inside, and are not much more difficult to break down than a hollow wood door. Even if you have a reinforced metal utility door, keep in mind that it is highly resistant to intrusion, but not bulletproof. It takes over an inch of regular mild steel to stop most rifle bullets. In contrast, it only takes 5/16" of tempered steel to stop high-powered rifle bullets. Not only is the thinner tempered steel plate lighter, but it is cheaper and tougher than 1" inch mild steel. With 1" steel, it would take a crane to put the door up. Even with the 5/16" tempered plate, it takes two or three men to handle the weight.

Bullet-resistant doors are made by only a few door manufacturers. Only one have I found to offer a Level 3 door at a reasonable price. Another big name outfit charges more for their Level 4 door (over $5000) than what I would pay for a full vault door (around $3000). So do check the "Recommended Equipment and Sources" section for specific recommendations before you buy. I am also presently experimenting with my gravel bulletproofing to see if a regular 2" thick 16 gauge reinforced utility door can be made bulletproof by taking out the insulation and replacing it with gravel. Most utility doors would not be suitable for this, since they are merely two sheets of light metal glued to a foam or honeycomb core. However, reinforced doors have vertical 18 gauge metal I-beams every 4" in the middle of the door. Thus, they are structurally very stiff – though not bulletproof. I'm anxious to see what gravel inserts would do for these doors. I'll keep you posted through my Online update on my website at http://www.joelskousen.com. For any bulletproof door, always order the metal jamb in a thickness of 14 gauge steel. Twelve gauge is even thicker and stronger. However, not all companies have 12 gauge available.

True bulletproofing cannot be had without an armored plate of tempered steel on the face of the door. Heflin Steel in Phoenix Arizona makes these plates and is very helpful in providing their "Armor Plate" to the residential customer. These plates must be attached to a reinforced utility door with ball-bearing hinges, to handle the increased weight. There are also large, full-length piano hinges available for utility doors. Make sure you have Heflin Steel cut the holes in the plate before they ship it to you. Otherwise the metal will be too hard to drill, without heating it up with a torch first. You will need 1/2" holes near each corner for attachment and holes for the dead bolt and door knob set.

If you go to all the trouble of putting a bulletproof plate on a door, I recommend you have custom dead bolts placed in both the top 1/3 of the door and the bottom 1/3. This gives three points of closure (counting the door latch) instead of two, and they are spread out over the door so as to keep the door from giving way under force – especially at the bottom where it is more vulnerable. See the explanation below in the lock section about how to bevel your bulletproof door plate holes so that they fit tightly over the dead bolt and keep them supported when under attack.

Doors that may be subject to explosive blasts, storm forces, or heavy blows to force them open should be reinforced utility doors, as previously described. It is also necessary

under some circumstances to put a 1/4-inch steel plate on the front to keep the structure from being damaged by multiple blows. Under the threat of concerted attacks, it is always necessary to have the additional security of vault- type locking pins which insert into all jamb faces. Short of using a regular vault door, you can always resort to the old pioneer trick of barring the door with a sturdy wood brace set in heavy metal brackets on either side of the door, both top and bottom. These are only effective as the strength of the brace attachments. Make sure they aren't just screwed into the wall. They should be welded to a heavy metal jam or bolted with hardened stove bolts. Hardened bolts are bolts that are tempered. They can be purchased at any specialty bolt shop – look in the yellow pages.

Security Gates

These are sometimes advisable for courtyard areas or open air vestibules. Every large city has a variety of ornamental iron shops that can make these gates. There are also a number of national firms that make ready-made gate and fence systems. In rural areas, or high crime residential areas, it is always important to have a fence and a locked gate. This lets you know that if someone is inside that gate, without having rung the bell, they are a security threat. Unfortunately, many local city codes prohibit security fences in residential neighborhoods – especially in the front. They feel it is very unneighborly. Perhaps so, but so is crime, and a citizen should have the right to put up suitable passive defense barriers.

Locks

Locks must match the security level of the rest of the home. It does no good to put a high security lockset on a hollow core door, any more than it does to put a conventional tumbler cylinder lockset on a bullet resistant door. There are a variety of specialty locks on the commercial market – everything from magnetic keys to ones that respond to your hand and/or voiceprint. For practical purposes, you can achieve as much security as you need with one of several "pick-proof" cylinder locks. One type, the Norman cylinder, uses a unique concept that forces the keys to unlock all of the pins simultaneously. Virtually all lock picking techniques take advantage of the fact that other cylinders unlock each pin individually. This cannot be done with the Norman cylinder. Also, all keys are reproduced only at the factory. Someone cannot run down to the local locksmith and get a copy of your key. The Medeco lock is pick-resistant and almost pick proof. The manner in which the key faces are cut requires the pins to rotate before they will unlock. This makes them almost unpickable without special Medeco tools. The ASSA pick-proof deadbolt is built to withstand heavy hammering, and has a double row of pins in the cylinder. It is considered pick-proof.

No dead bolt is any stronger, however, than its attachment to or through the door. A large sledge hammer can knock a dead bolt off the door if the door metal is thin. The illustration below shows a metal utility door that has a bulletproof 5/16" tempered steel face attached for the ultimate security. If you will look closely, you can see that the pre-cut holes made by Heflin Steel (as per your dimensions and instructions) have been beveled in order to tightly fit around the dead bolt. Since Heflin does not do this bevel,

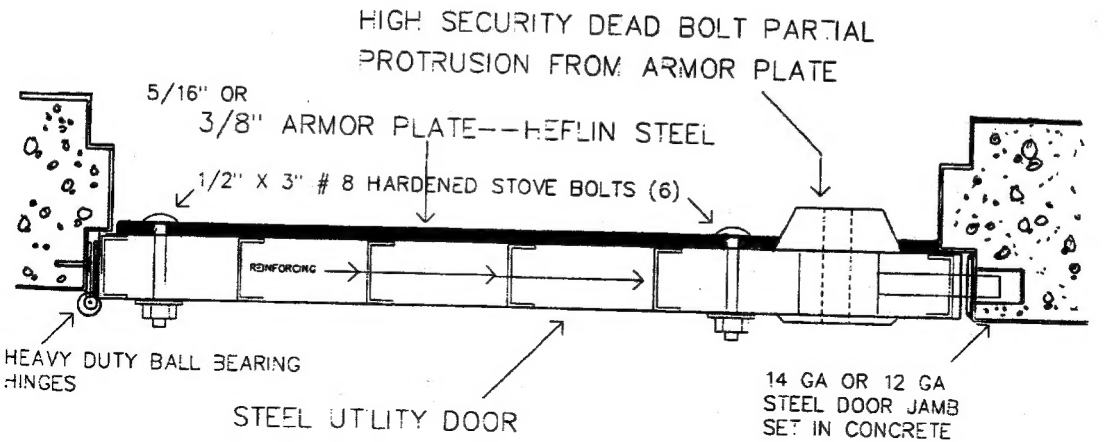
Acrylic Plastic Storm Windows

The least expensive way to protect your windows from intrusion and breakage is to install acrylic plastic (trade names like Lexan or Plexiglas) storm windows on the outside of all glazing. If you use the most expensive acrylics, the cost will still be much lower than external rolling security shutters. The least expensive shutters will cost at least a $1,000 per window including installation. On the other hand, acrylic storm window will cost around $300 per window. This remedy provides an unbreakable layer of protection if used in thickness of at least 1/4 to 3/8 inch depending on window size. Larger plate glass windows need 1/2 inch material. However, acrylic plastic does not provide privacy or sun protection like rolling shutters – one of the compensations for their high cost. Two other problems with acrylic storm windows are: first, lack of ventilation when windows are open, and second, susceptibility to being easily scratched. The ventilation problem can be solved partially by drilling a series of 1/4 inch holes along the bottom and top, or by mounting the storm window frame on small strips of scrap acrylic (which leaves small, almost invisible slots behind the frame work). Acrylic is not bulletproof except in the thicker glass/plastic laminates of 1/2" or thicker. Straight 3/8" acrylic will stop small glancing caliber rounds like the .22 or .25 auto.

Acrylic or Mylar Film

There are several brands of high tensile strength plastic films that are professionally installed with a special clear adhesive to the inside of your windows. These make your glass entry-proof and bulletproof to light, small pistol ammunition, and they have the advantage of still allowing you to open your windows for regular ventilation. Naturally if the windows are attacked, the glass will crack, but it will stay intact – even under repeated blows. This stuff is amazing and reasonably priced. Care must be taken on cleaning the inside so as not to scratch the surface. But the inside is not as susceptible to damage as the outside, which is often subjected to blowing grit and dust.

Bulletproof Glazing

Bulletproof glass is an alternative for special needs only. Cost-wise, it is the most expensive alternative – not because the 1" thick glass/acrylic laminate itself is so costly, but the custom window frames to accommodate this thickness of glazing are so expensive. For full protection, the frames must be metal. However, any damage to the laminated glass will require extensive replacement costs. Bulletproof glass does stop bullets, but not without shattering the glass surfaces which must be replaced for aesthetic reasons. Bulletproof glass will also not sustain multiple hits in the same area without failure.

you must carefully measure around the dead bolt 5/16" away from the original door face to determine the smallest diameter of the bevel hole. This is the diameter hole size you tell Heflin Steel to cut. When you get the door plate, grind the bevel with a small grinding wheel attached to an electric drill. It takes a little while. Use the dead bolt itself to keep checking your bevel until it fits into the steel plate tightly. Now attach the dead bolt to the utility door, place the bulletproof plate on top (with the utility door laying on horizontally supports) and drill through the attachment holes of the plate, into the utility door. Use hardened stove bolts from automotive supply shops (#8 hardness) to secure the plate to the door. Then mount the door to the frame with the heavy duty ball bearing or piano hinges.